

WHAT IS CLAIMED IS:

1. A sample container, comprising:
a container housing having an open end and a hollow interior region;
a repuncturable self-sealing membrane engaged in the open end of the container housing and configured to self-seal after repeated punctures, the repuncturable self-sealing membrane comprising an exterior surface exposed to the external environment, and an interior surface oriented toward the hollow interior region of the container housing; and
a collapsible sample bag comprising a proximate end that is permanently attached to the interior surface of the repuncturable self-sealing membrane.
2. The sample container of claim 1, wherein the container housing and collapsible sample bag are cylindrical in shape.
3. The sample container of claim 1, wherein the collapsible sample bag and the container housing comprises a material which has a maximum dielectric loss factor of 1×10^{-3} at one or more frequencies from 1 KHz to 1,000 GHz.
4. The sample container of claim 1, further comprising a container plug circumscribing the repuncturable self-sealing membrane, the container plug comprises one or more vents for admitting the external environment into the hollow interior region of the container housing.
5. The sample container of claim 1, wherein the repuncturable self-sealing membrane comprises one or more vents for admitting the external environment into the hollow interior region of the container housing.
6. The sample container of claim 1, wherein the interior hollow region of the container housing comprises a temperature controlled chamber.
7. The sample container of claim 1, wherein the repuncturable self-sealing membrane and the collapsible sample bag are composed of dissimilar materials.

8. The sample container of claim 6, further comprising a fluid occupying a least a portion of the hollow interior region of the container housing.

9. The sample container of claim 6, further comprising a heating or cooling element attached to the exterior surface of the container housing.

10. The sample container of claim 7, wherein the repuncturable self-sealing membrane is formed from silicon, latex, or polyurethane.

11. The sample container of claim 7, wherein the integral attachment between the interior surface of the repuncturable self-sealing membrane and the proximate end of the collapsible sample bag comprises a co-molded bond.

12. The sample container of claim 1, wherein the container housing is substantially the size of a conventional test tube.

13. The sample container of claim 1, wherein the radius of the container housing is substantially the radius of a well in a 96 well tray.

14. The sample container of claim 1, wherein the radius of the container housing is substantially the radius of a well in a 384 well tray.

15. The sample container of claim 1, wherein the radius of the container housing is substantially the radius of a well in a 1536 well tray.

16. The sample container of claim 1, wherein the collapsible bag has a collapsed volume of less than 10,000 microliters.

17. The sample container of claim 16, wherein the collapsible bag has a collapsed volume of substantially 0.01 microliters and an expandable volume of greater than 1 microliter.

18. An array of sample containers, comprising:
a plate having a first major surface;
a plurality of container housings formed within the first major surface of the plate, each of the plurality of container housings having an open end and a hollow interior region;

a plurality of repuncturable self-sealing membranes engaged in the open end of a respective plurality of container housings, wherein each of the plurality of repuncturable self-sealing membranes comprises an exterior surface exposed to an external environment, and an interior surface oriented toward the hollow interior region of the container housing; and

a plurality of collapsible sample bags extending into a respective plurality of hollow interior regions of the container housings, each collapsible sample bag comprising a proximate end that is permanently attached to the interior surface of the repuncturable self-sealing membrane.

19. The array of claim 18, wherein the radius of the container housing is the radius of a well in a 96 well tray, and wherein the plate comprises a 96 well tray.

20. The array of claim 18, wherein the radius of the container housing is the radius of a well in a 384 well tray, and wherein the plate comprises a 384 well tray.

21. The array of claim 18, wherein the radius of the container housing is the radius of a well in a 1536 well tray, and wherein the plate comprises a 1536 well tray.

22. The array of claim 18, wherein one or more of the plurality of collapsible sample bags and a respective one or more plurality of container housings is formed from a material which has a maximum dielectric loss factor of 1×10^{-3} at one or more frequencies from 1 KHz to 1000 GHz.

23. The sample container of claim 19, wherein the plate comprises a 96 well tray having a standard microtitre format compatible with an automated sample handling processor.

24. The sample container of claim 20, wherein the plate comprises a 384 well tray having a standard microtiter format compatible with an automated sample handling processor.

25. The sample container of claim 21, wherein the plate comprises a 1536 well tray having a standard microtiter format compatible with an automated sample handling processor.

26. The array of claim 18, wherein the one or one or more of the plurality of repuncturable self-sealing membranes and respective one or more collapsible sample bags are formed from dissimilar materials.

27. The sample container of claim 26, wherein the repuncturable self-sealing membrane is formed from silicon, latex, or polyurethane.

28. The sample container of claim 18, wherein the interior hollow region of one or more of the plurality of containers housing comprises a temperature controlled chamber.

29. The sample container of claim 28, further comprising a fluid occupying a least a portion of the hollow interior region of the one or more container housings.

30. The sample container of claim 28, further comprising a heating or cooling element attached to the exterior surface of the one or more container housings.

31. A sample container, comprising:
a repuncturable self-sealing membrane configured to self-seal after repeated punctures, the repuncturable self-sealing membrane comprising a first major surface and a second major surface; and
a collapsible sample bag comprising a proximate end that is permanently attached to the first surface of the repuncturable self-sealing membrane.